

Taking Things at Face Value: How Stance Informs Politeness of Virtual Agents

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Abstract. In this paper, we contend that interpersonal circumplex theories and politeness strategies may be combined to inform the generation of social behaviours for virtual agents. We show how stances from the interpersonal circumplex correspond to certain politeness strategies and present the results of a small pilot study that partially supports our approach. Our goal is to implement this model in a serious game for police training.

1 Introduction

The automatic generation of social behaviour has been characterized as a ‘crucial need’ for artificial agents, robots and other intelligent interfaces capable of human-like interaction [14]. In this paper, we focus on social interaction within the field of law enforcement. To assist in the training curriculum of the Dutch police, we are developing a serious game in which police officers will interact with virtual agents to improve their social awareness. How police officers approach and try to reason with civilians and offenders can determine how certain situations are resolved. The Dutch police strive to enforce the law by dealing with conflicts in a de-escalating way. That is, whenever they approach and try to reason with civilians, their goal is to defuse the situation non-aggressively. Being aware of the other’s as well as of their own social behaviour is of importance for police officers during such interactions. Therefore, the curriculum of police trainees includes social awareness training. However, these trainings are mainly theoretical, with only few practical training sessions in the form of interaction with actors. Moreover, only a few police officers in training are able to participate in these sessions due to both monetary and time costs—the remaining trainees are restricted to being an audience.

We take on the view that the behaviour of the agents in our serious game should be informed by theories about social interaction that relate to interpersonal attitudes or *stances*. The current training curriculum of police trainees already includes stance theory. We argue that stances are closely related to *politeness*, and propose a mapping of stances to specific combinations of politeness (or impoliteness) strategies.

This paper presents the basis of this approach. First we discuss some related work in section 2. Two theories about stance and politeness are explained in

section 3. In section 4, we discuss the relation between stance and politeness and show how social behaviour can be informed by the combination of the two. We describe a small user experiment carried out to evaluate our model in section 5 and end with conclusions in section 6.

2 Related Work

Past work on social interaction with or between virtual agents has focused on emotions rather than stance [1, 12]. While emotions certainly influence people’s behaviour, our approach focuses on people’s attitudes toward each other, based on the interpersonal circumplex theory (see section 3.2). Another serious game implementing this theory for human-virtual-agent communication is deLearyous [13]. This game focuses on training interpersonal communication skills in a working environment setting, letting users interact with virtual agents through written natural language input. One of the findings of this project was that determining the stance of dialogue utterances is a very difficult task, even for human annotators.

In our work, we focus on generating utterances that appropriately express the agent’s stance. To this end, we combine interpersonal circumplex theories with Brown and Levinson’s politeness strategies [2] (see section 3.1). Walker et al. presented one of the first designs for politeness in virtual agents based on these strategies [15]. Their work revolved around using social and affective character traits to inform linguistic style. Gupta et al. continued this work by implementing Brown and Levinson’s politeness strategies in POLLY, a system which features a collaborative task-oriented dialogue [5]. They showed that users’ perception of the level of politeness of the strategies was largely consistent with Brown and Levinson’s theory. Porayska-Pomsta and Mellish implemented a virtual tutor which relies on case-based reasoning to determine which politeness strategy to use [10]. Unlike the work presented in this paper, these previous approaches did not explicitly involve interpersonal attitudes.

3 Theoretical Background

Our model of politeness of social interactions relies on the combination of two theories: the interpersonal circumplex and face theory, which are discussed below.

3.1 Face and Politeness Strategies

Brown and Levinson’s work on politeness [2] is based on the notion of *face*, which is a person’s public self-image [4]. Brown and Levinson (hereafter, B&L) distinguish between negative and positive face, which denote one’s need for freedom and one’s need to be approved of and approving of others, respectively. By taking an action, a speaker potentially imposes on a hearer’s face by threatening the latter’s needs—such an action is called a face-threatening act (FTA). B&L

discuss which strategies can be used to minimize the imposition of an FTA—in other words, how one can be polite. They distinguish the following four strategy types to do so, ordered from least to most polite:¹

Bald on-record Being straight to the point, e.g., “Hand me the book.”

Positive politeness Taking the other’s wants into account, e.g., “Would you like to hand me the book?”

Negative politeness Not hindering the other’s autonomy, e.g., “If it’s not inconvenient to you, could you hand me the book?”

Off record Being indirect or vague about one’s own wants, e.g., “I don’t seem to be able to reach that book.”

Obviously, these politeness strategies do not take into account that people might not want to minimize imposition of their FTAs. Being able to deal with *impoliteness* is especially important for the law enforcement domain, in which police officers and offenders may not care much about each other’s face needs, leading to dominant or (verbally) aggressive behaviour. To account for such behaviour, Culpeper et al. [3] investigated impoliteness strategies that are complementary to B&L’s strategies. They focus on impoliteness strategies through which the speaker attacks the addressee’s positive and negative face needs. Indeed, these are the inverse of B&L’s positive and negative face strategies:²

Positive impoliteness Damaging the addressee’s positive face wants by excluding him or her, being disinterested, disassociating oneself from the addressee or using taboo words. E.g., “Just hand me the bloody book and leave me alone.”

Negative impoliteness Damaging the addressee’s negative face wants by being condescending, frightening him or her or invading his or her space. E.g., “Hand me the book now, or I’ll come and get it.”

3.2 The Interpersonal Circumplex

Originating in Leary’s work [9] as a tool for diagnosis in a psychotherapeutic setting, a number of varying interpersonal circumplex (IPC) measures of personality have been developed; see [6] for an overview. The IPC model classifies attitudes people have toward each other along two axes: that of dominance and that of affection.³ Dominance refers to the concepts of one’s own autonomy and control over others, while affection stands for affiliating and being accommodating toward or approving of others.

Evaluations of the IPC show that each degree of dominance and affection corresponds to a *stance* [6]. Scherer defines stances as being “characteristic of

¹ An exhaustive list of instantiations of these strategies can be found in [2].

² See [3, p. 1555] for more examples of impoliteness strategies.

³ We adopt these terms as we feel they are clear and unambiguous; variants include ‘agency and communion’ [6], ‘autonomy and friendliness’ and ‘dominance and sociability’.

an affective style that spontaneously develops or is strategically employed in the interaction with a person or a group of persons, colouring the interpersonal exchange in that situation,” [11, p. 705]. For example, one might be dominant and hostile toward someone (high dominance, low affection), resulting in an ‘arrogant’ stance, or one may adopt a submissive and affectionate attitude (low dominance, high affection), which results in an ‘agreeable’ stance. Figure 1 shows an example mapping of these two dimensions to a circle and a division into eight octants, each of these corresponding to a stance with a descriptive adjective based on the Interpersonal Adjective Scales [16].

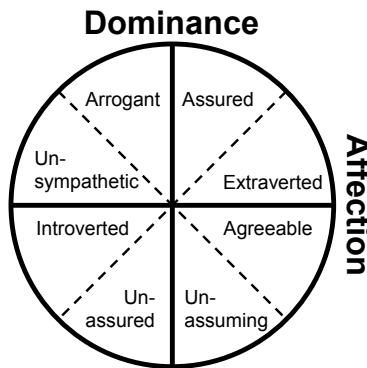


Fig. 1. The interpersonal circumplex, a model which splits social interaction into eight different stances according to the axes of dominance and affection (based on [16]).

4 Stance and Politeness Model

In this section, we propose a model for generating politeness strategies. This model is based on two ideas: (1) politeness strategies can be mixed (section 4.1) and (2) the interpersonal circumplex and politeness theories about face are based on the same principles (section 4.2). In section 4.3, we explain how the model can be used to construct actions for socially interacting agents.

4.1 Mixing Politeness Strategies

Most computational approaches to politeness look at how face-threatening certain acts are by ranking the face threats of those acts in varying ways. For example, following B&L, Walker et al. sum the social distance between the interaction partners, the relative power of one over the other and a static value for imposition of the act [2, 15]. Based on the result, one of the four politeness strategies is then selected to realise the speech act, with the more polite strategies (negative or off record) being used for the bigger face threats.

In our opinion, such a one-dimensional ranking of face threats and politeness strategies disregards the basis of Brown and Levinson’s politeness theory, namely

that an act may threaten both positive and negative face. This suggests that a combination of strategies could be used to minimize both impositions. However, B&L oppose the idea of mixing their strategies to express an FTA. They are aware of such mixing occurring in natural discourse, but assert that such utterances express multiple FTAs which need to be ranked separately. Nonetheless, Hasegawa shows that (in Japanese) counterexamples do exist [7]. This view is supported by the observation of Porayska-Pomsta and Mellish that linguistic politeness strategies can address positive and negative face at the same time, and should be classified two-dimensionally [10]. Culpeper et al. show that this also holds for impoliteness strategies, as the positive impoliteness strategy of using taboo words can be mixed straightforwardly with negative impoliteness strategies [3, p. 1561] by simply inserting such words in negative impolite utterances. Therefore, in our model we assume that mixing politeness strategies is possible.

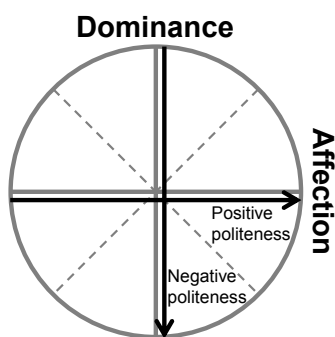


Fig. 2. The relation between the two dimensions of the IPC (dominance and affection) and the two types of politeness (positive and negative). Positive politeness and affection are directly proportional, while negative politeness and dominance have an inverse relation.

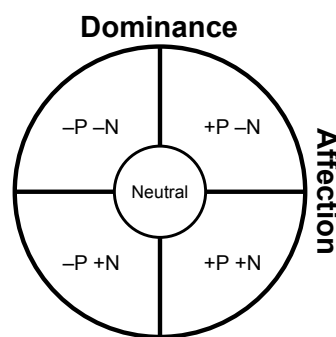


Fig. 3. The mapping of politeness strategies to the IPC. *N* and *P* denote ‘negative’ and ‘positive’, while the + and – signs denote politeness and impoliteness respectively.

4.2 Combining Face and Stance

Intrinsic to both IPC theories and B&L’s politeness theory is that they feature interpersonal relations. Moreover, attitude and stance toward interaction partners play a key part in the choice of actions and the way they are carried out. Dominance and affection, the two dimensions of the IPC, are very similar to the concepts of negative and positive face, respectively. Clearly, dominance revolves around the notion of a person’s autonomy. Where the IPC is concerned, this dimension signifies the person’s own autonomy, whereas negative politeness strategies address the other’s autonomy. As the autonomy of both parties is inversely related, we equate a low value for dominance in the IPC to a high negative face value and vice versa. In other words, when a speaker expresses

little agency, he acts submissively and only threatens the hearer’s negative face to a small degree. Similarly, we correlate the dimension of positive face—striving toward acceptance and being approved by others—to that of affection. In this case, a low value of affection corresponds to being ‘disconnected’ [8], which is directly related to not taking into account the hearer’s positive face. Figure 2 shows how negative and positive politeness can be mapped to dominance and affection. When the intention of a speaker is neither to attack an addressee’s face (be impolite) nor to weaken his FTA (be polite), we assume that he or she will use B&L’s ‘bald on record’ strategy. In the IPC, this strategy corresponds to having a ‘neutral’ stance, which is found at the origin of the IPC’s axes.

Our model does not include off record strategies at this point. Gupta et al. showed that off record strategies are not necessarily the most polite, as claimed by B&L [5]. Culpeper et al. suggest a structure parallel to that of politeness to resolve this [3, p. 1554], but this is outside the scope of this paper. Figure 3 shows the mapping of the different combinations of politeness strategies as well as the inclusion of the neutral ‘bald on record’ strategy.

4.3 Utterance Realisations

As shown above, the different politeness strategies addressing negative and positive face can be mapped straightforwardly to IPC stances. Thus, we can construct actions for a given stance by combining the politeness strategies that correspond to that stance. We limit our approach by only taking five stances into account, namely the four combinations of high and low dominance or affection and a fifth ‘neutral’ stance which represents the origin of the two axes of the IPC. That is, we do not divide the IPC into eight stances as in Fig. 1, but take the stances of each of the four quarters of the IPC (for example, ‘arrogant’ and ‘unsympathetic’) together as one stance, as shown in Fig. 3.

Based on the intention of a speaker and a given stance, we can realise an utterance within a given scenario. For example, in a situation in which a few loitering juveniles are playing loud music on a square, the police officer’s intention will probably be to reduce the noise level. He then needs to carry out the act of asking the juveniles to turn down the volume, which both limits their freedom (a negative face threat) and implies disapproval (a positive face threat). When the police officer has a dominant yet affectionate stance, he will, according to our theory, use a positive politeness strategy combined with a negative impoliteness strategy (+ P – N in Fig. 3).

We mix different politeness strategies by creating complex sentences consisting of two clauses, each of which is an instantiation of one type of politeness strategy. Since each clause expresses a different dialogue act, this approach seemingly reflects B&L’s opinion about how strategies cannot be mixed in one utterance (see section 4.1). However, we see the compound sentence, taken as a whole, as capturing the intention of being dominant and being affectionate concurrently (or, equivalently, being negatively impolite and positively polite at the same time). This is in line with the findings of Porayska-Pomsta and Mellish

[10]. In a corpus of tutoring dialogues they observed complex strategies that consisted of a main strategy used to express the main message of an act, combined with an auxiliary strategy used to express redress.

Table 1. Example utterances based on five different stances and corresponding (im)politeness strategies (from [2, 3]) in different scenarios. A and D stand for affection and dominance, respectively, with the $+$ and $-$ signs and 0 denoting the value of these dimensions (positive, negative and neutral).

Scenario description	Stance	Politeness strategies	Utterance
Loitering juveniles have just told the police officer to go away. The police officer refuses.	$+A+D$	$+P-N$ (convey cooperation, condescend/ridicule)	“As if I would take orders from you! We can work this out together.”
Juveniles are smoking in a shopping mall; the police officer wants to inform them this is not allowed.	$+A-D$	$+P+N$ (raise common ground, question)	“I like a smoke now and then as well, but did you know that smoking isn’t actually allowed here?”
Loitering juveniles are playing loud music; the police officer wants them to dim the noise.	$-A+D$	$-P-N$ (unsympathetic, invade space)	“What a racket! You have to stop this immediately.”
The police officer has just asked the juveniles to move away, but after a short discussion he decides to let them stay against his will.	$-A-D$	$-P+N$ (disassociate, apologize)	“I’m sorry to have bothered you, but this is going nowhere anyway.”
Juveniles are bothering passers-by in a shopping mall. The police officer wants to make clear that people are feeling harassed.	$0A0D$ (neutral)	$0P0N$ (bald on record)	“Some people feel harassed by you.”

In the example scenario, the positive politeness strategy of a police officer would for instance be to say “I understand that you want to chill and listen to music,” through which he tries to claim common ground and attend to the juveniles’ interests. The negative impoliteness strategy could be instantiated by saying “You have to stop this immediately,” which shows the police officer’s resolve to impose on the juveniles’ autonomy. Taken together, these two sentences will be the police officer’s utterance when he takes an affectionate but dominant stance: “I understand that you want to chill and listen to music, but you

have to stop this immediately.” Table 1 lists a variety of example utterances (translated from Dutch) that we constructed based on different scenarios and different stances of a police officer toward a group of loitering juveniles. These and other utterances were used in a small user experiment to evaluate our model, as described below.

5 Pilot Study

To validate our ideas about the relations between a person’s stance and the politeness of that person’s utterances, we conducted a small user experiment. By means of a survey we intended to find out whether politeness strategies indeed correspond to stances as proposed in our model.

5.1 Method and Measures

We carried out an online survey in which participants were asked to give their opinion about the stance of a police officer who is addressing a group of loitering juveniles in various scenarios. For this survey, we constructed a collection of utterances for the police officer based on five different stances, as described in the previous section. In the design of these utterances, we took two additional factors into account, namely that both speech act types as well as contextual content of utterances may influence the face-threat of an act, as noted by Walker et al. [15]. Therefore, we designed utterances for four different speech act types, namely *inform*, *request*, *reject* and *acknowledge*. For each of these speech act types, we conceived two scenarios with a different context to provide a broad collection of situations. For example, for the *request* speech act type, we let the police officer ask juveniles to turn down their loud music in one scenario and let him ask the juveniles to move away from their hangout place in another. Per scenario, we constructed six utterances. Five of these were constructed as explained in the previous section and one was a ‘distractor’ item. The latter was devised to offer more variety in the survey as well as to make it harder for participants to see through the pattern of the survey questions. In total, we created 48 utterances across 8 scenarios, with each scenario containing 6 utterances of which 5 according to different stances and one being a distractor.

At the beginning of the survey, we explained to the participants that they had to judge the stance of the police officer based on his utterances. We explained that they should do so by rating the police officer’s intended dominance and affection toward the juveniles. Participants could indicate their ratings of dominance and affection on two distinct Likert-scales ranging from 1 to 5, where 1 stood for ‘not at all’ and 5 for ‘completely’. Furthermore, we made clear that only verbal actions were included in the scenarios and that none of these utterances should be taken to be sarcastic or ironic.

After having read the instructions and having indicated they understood them, the participants were presented with one of the eight different scenarios and the six corresponding police officer utterances. After rating the intended

dominance and affection of the police officer, participants were asked if they had any comments or critique on the utterances, which they could write down in a text input field. Then, they could continue to the next scenario. Finally, we collected information on the participants' age and gender. We also asked them about their familiarity with interpersonal circumplex theories and theories on politeness and face, as such familiarity might have influenced their judgements.

Table 2. Mean ratings of utterances per stance ($n = 144$; 8 utterances per stance \times 18 participants). T-test values are indicated where significant; * means $p < .05$, ** means $p < .005$.

Stance	Politeness	Means (SD)		T-test ($t(17)$, $value = 3$)	
		Affection	Dominance	Affection	Dominance
+A +D	+P -N	3.10 (.68)	2.78 (.42)	n.s.	-2.24 *
+A -D	+P +N	2.96 (.67)	2.83 (.49)	n.s.	n.s.
-A +D	-P -N	2.49 (.55)	3.35 (.63)	-3.94 **	2.35 *
-A -D	-P +N	2.68 (.54)	2.71 (.63)	-2.51 *	n.s.
0A 0D	0P 0N	2.57 (.54)	3.21 (.53)	-3.41 **	n.s.

5.2 Results

A total of 18 participants took part in our survey, of which 9 males, 8 females and one person who did not wish to indicate his or her gender. The average age of the participants was 29.9 ($SD = 9.3$). The majority of the participants (13) indicated that they did not know or had only heard of the IPC; 5 knew the basics of the theory or had more in-depth understanding. Almost all participants (15) indicated that they had never heard of B&L's politeness strategies.

We calculated the means of the participants' ratings of the utterances for each of the five described stances; $n = 144$ utterances per stance (8 scenarios, 18 participants). Then, we performed one-sample t-tests to investigate whether the mean ratings of utterances were significantly different from the neutral values for dominance and affection (in both cases, the neutral value was 3, the middle of our Likert-scales which ran from 1 to 5). Table 2 shows the means, standard deviations and one-sample t-test results. Only the most impolite ($-P -N$) utterances had average ratings for both dominance and affection that differed significantly from the neutral value. In all other cases, at most one of the ratings differed from neutral, and not always in the predicted direction. Interestingly, the mean affection rating of neutral stance utterances (0A 0D) did differ significantly from the (in this case desired) neutral value.

Next, we investigated the differences between the means of the different stance utterances through paired-samples t-tests. Here, the most obvious dif-

ference was between the most impolite ($-A +D$, $-P -N$) and the most polite ($+A -D$, $+P +N$) utterances; $t(17) = 7.34, p < .001$ for dominance and $t(17) = -6.73, p < .001$ for affection. These results show that, indeed, utterances combining two (negative and positive) impoliteness strategies were rated as more dominant and less affectionate than utterances that combined two politeness strategies. Similar results were achieved when comparing the most impolite ($-A +D$) utterances with the other utterances; the only type of utterance that did not differ significantly from the $-A +D$ category was the neutral type.

Most of the purely polite or impolite ($+P +N$ and $-P -N$) utterances proved to differ significantly from the utterances that combined polite and impolite strategies ($+P -N$ and $-P +N$, used to express the $+A +D$ and $-A -D$ stances respectively). Specifically, they differed in the mean rating of the stance dimension that was varied between the utterances. For example, the purely impolite $-A +D$ utterances were rated as significantly more dominant than the ‘mixed’ $-A -D$ utterances; $t(17) = 6.74, p < .001$. Similarly, ratings of affection for the impolite $-A +D$ utterances were significantly lower than for the $+A +D$ utterances; $t(17) = -8.04, p < .001$. Yet in the latter comparison, the ratings of dominance were also significantly higher for the $-A +D$ utterances than for the $+A +D$ utterances, even though this dimension was not varied between the two cases; $t(17) = 5.83, p < .001$. This unexpected difference is caused by the low dominance ratings of the mixed utterances expressing the $+A +D$ stance (as shown in Table 2). The opposite effect did however not occur when comparing the ratings of the purely polite $+A -D$ utterances to those of the mixed $+A +D$ utterances; these ratings did not differ significantly.

5.3 Discussion

The results of our pilot study show that, on average, the utterances we constructed were rated close to the neutral middle of the dominance and affection scales. This lack of ‘extreme’ utterances may explain why utterances that were intended to be neutral were rated as being as dominant and unaffectionate as those that were intended to be the most dominant and the least affectionate. However, this rating may also be an indication that neutral utterances are, in their directness, indeed always very bald to the point of being impolite.

Some participants commented that they found it hard to judge the police officer’s stance based on the presented utterances, as there was (1) no information about the intonation of the utterances and (2) insufficient context to determine how dominant or affective the police officer ‘ought’ to be. This may be the case because the extreme ends of the scales could be interpreted as the police officer being overly dominant or affectionate, as one participant indicated. Moreover, some of the participants expected the police officers to behave in a much more dominant and much less affectionate fashion than included in the survey.

Nevertheless, the results do confirm our hypothesis that, at least for dominant/unaffectionate and submissive/affectionate stances, B&L’s politeness strategies can be used to construct utterances that reflect these stances. Although

mixing positive strategies with negative strategies generally worked well, mixing polite strategies with impolite strategies sometimes resulted in successfully expressing the predicted stance, but at other times resulted in ambiguous utterances (as participants commented). Mixing politeness and impoliteness also caused dominant/affectionate utterances to be rated as much less dominant than predicted.

Based on these findings we see various ways to improve our model. First and foremost, we need to support a wider variety of utterances that cover more gradations of dominance and affection. To do so, we plan to gather more domain knowledge from both police officers and (former) loiterers. This will also help to provide a richer context for the scenarios. Furthermore, we plan to investigate how politeness strategies can be mixed so that they are perceived as less ambiguous. Lastly, we believe that to make utterances better express stances, we should look at the processes underlying the adoption of stances, for example by investigating how people appraise events in terms of face values. In future work, we will first investigate the possible correlations of speech acts and different contexts with the ratings of utterances, as these correlations are not addressed in this paper due to space constraints.

6 Conclusion

Being socially aware is of great importance to police officers during their day-to-day dealings with civilians. To assist them in attaining this awareness, we are designing a serious game that will include virtual agents with which police officers can train their social skills. This paper outlines the first steps we have taken toward creating models that will inform the behaviour of these agents.

Our approach combines the interpersonal circumplex theory [6] and Brown and Levinson's theory about politeness [2]. We assert that both these theories share the same fundamentals of social interaction, namely that people have needs for autonomy (dominance) and for affection. In our model, we state that stances (following the interpersonal circumplex theory) correspond to politeness strategies. That is, an agent with a dominant stance will use negative impoliteness while an agent with an affectionate stance will use positive politeness. Conversely, a submissive stance is expressed through negative politeness and an unaffectionate stance through positive impoliteness. Our second assertion was that these politeness strategies can be mixed to account for all different stances.

To determine the validity of our model, we conducted a small user study in which we let participants rate utterances of police officers on the dominant and affectionate stance dimensions. The results from our experiment support our model in the case of utterances mixing either both positive and negative polite or positive and negative impolite clauses. However, ratings of utterances based on combinations of impolite and polite strategies did not completely meet our expectations, as they were sometimes perceived as ambiguous. To overcome such ambiguity, we intend to investigate in more detail how such utterances influence an addressee's autonomy and affection. Additionally, we plan to gather more

domain knowledge to extend the range of possible utterances. We also need to determine how our agents should react to different utterances. In the end, social interaction does not consist of merely taking stances at face value—this is only the first step.

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